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| 09/936,618      | 03/05/2002  | Norio Maeda          | 33093M006           | 9087             |

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| EXAMINER |
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LU, JIPING

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| ART UNIT | PAPER NUMBER |
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3749

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11/01/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

09/936,618

Applicant(s)

MAEDA ET AL.

Examiner

Jiping Lu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 August 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-3, 5-12, 14-19, 21-24 and 26-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 21 is/are allowed.
- 6) ☒ Claim(s) 1-2, 5-9, 10-11, 14-19, 22-24, 26-28 is/are rejected.
- 7) ☒ Claim(s) 3 and 12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

**DETAILED ACTION*****Claim Rejections - 35 USC § 103***

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 10, 14, 17, 22-23, 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrell (U. S. Pat. 5,653,045) in view of Kedo et al. (U. S. Pat. 6,219,936).

Ferrell teaches an apparatus of drying substrate comprising a processing vessel 602 for holding substrates 601 at an angle of 0 degrees with respect to vertical in the processing vessel 602, means (not numbered, see Fig. 6) for supporting substrates 601 within the processing vessel 602, means 618, 620 for continuously lowering a fluid face of the cleaning fluid 622 within the processing vessel with respect to the substrate, means 606 for introducing a drying fluid 607 under a liquid condition within the processing vessel using a nozzle 610 to form individual liquid drops of a drying fluid 607, and means 612, 614 for supplying inert gas into the processing vessel same as claimed. The drying fluid 607 was introduced at room temperature under liquid condition into processing vessel 602 onto the fluid face 622 of the cleaning fluid. The fluid face 622 of the cleaning fluid was lowered with respect to the substrate and the vessel 602 was purges with hot nitrogen. Note column 10, line 10 to column 11, line 8; column 11, lines 30-31; and Figures 6 and 6. Means 612, 614 is capable of supplying inert gas into the processing vessel during exhausting of the cleaning fluid from the processing vessel. Means 612, 614, 620, 622 is capable to continuously maintain the liquid layer of the drying fluid for continuously lowering a fluid face of the drying fluid 607 such that a liquid layer of the drying fluid on the cleaning fluid

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is continuously maintained. However, Ferrell does not disclose means or controlling section for controlling the inert gas supplying section, the exhausting section and the drying fluid supplying section. Kedo et al. teaches a substrate drying apparatus with means or controlling section 41 for controlling the inert gas supplying section 18, the exhausting section 7 and the drying fluid supplying section 13 same as claimed. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the substrate drying apparatus of Ferrell to include means or controlling section for controlling the inert gas supplying section, the exhausting section and the drying fluid supplying section as taught by Kedo et al. in order to more efficiently control the drying.

3. Claims 10, 14, 17-19, 22-23, 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrell (U. S. Pat. 5,653,045) in view of Taniyama et al. (U. S. Pat. 6,247,479).

Ferrell teaches an apparatus of drying substrate comprising a processing vessel 602 for holding substrates 601 at an angle of 0 degrees with respect to vertical in the processing vessel 602, means (not numbered, see Fig. 6) for supporting substrates 601 within the processing vessel 602, means 618, 620 for continuously lowering a fluid face of the cleaning fluid 622 within the processing vessel with respect to the substrate, means 606 for introducing a drying fluid 607 under a liquid condition within the processing vessel using a nozzle 610 to form individual liquid drops of a drying fluid 607, and means 612, 614 for supplying inert gas into the processing vessel same as claimed. The drying fluid 607 was introduced at room temperature under liquid condition into processing vessel 602 onto the fluid face 622 of the cleaning fluid. The fluid face 622 of the cleaning fluid was lowered with respect to the substrate and the vessel 602 was purges

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with hot nitrogen. Note column 10, line 10 to column 11, line 8; column 11, lines 30-31; and Figures 6 and 6. Means 612, 614 is capable of supplying inert gas into the processing vessel during exhausting of the cleaning fluid from the processing vessel. Means 612, 614, 620, 622 is capable to continuously maintain the liquid layer of the drying fluid for continuously lowering a fluid face of the drying fluid 607 such that a liquid layer of the drying fluid on the cleaning fluid is continuously maintained. However, Ferrell does not disclose means or controlling section for controlling the inert gas supplying section, the exhausting section and the drying fluid supplying section. Ferrell also does not disclose means for moving the nozzle closer to the substrate after it has been removed from the cleaning solution and circulation means for the liquid components. Taniyama et al. teaches a substrate drying apparatus with means or controlling section 60 for controlling the inert gas supplying section 66, the exhausting section 28 and the drying fluid supplying section 64, means 149 for moving the nozzle 129 closer to the substrate W and circulation means for keeping liquids for substrate treatment purified and leading to less contaminants on the finished substrate (col. 7, lines 27-49 and Figure 4) same as claimed. As for the limitations, "for circulating the drying fluid" in claim 19, it viewed as functional or intended use limitations. As MPEP 2114 states, "[a] claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim". In this case, the limitation above does not add any structural limitations to the claim and Taniyama et al discloses all the structural limitations. Additionally while not disclosed, the circulation means of Taniyama et al. is capable of being used for circulating drying fluid. Therefore, it would have been obvious to one having ordinary skill in the art at the time the

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invention was made to modify the substrate drying apparatus of Ferrell to include means or controlling section for controlling the inert gas supplying section, the exhausting section and the drying fluid supplying section, means for moving nozzle and circulation means as taught by Taniyama et al. in order to more efficiently control the drying, to more precise directing of the drying fluid and to improve the drying efficiency, to keep liquids for substrate treatment purified and to reduce contaminants on the finished substrate, respectively.

4. Claims 1, 5, 7-10, 14, 17, 22, 23 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mohindra et al. (U. S. Pat. 5,772,784) in view of Kedo et al. (U. S. Pat. 6,219,936) or Taniyama et al. (U. S. Pat. 6,247,479).

Patent to Mohindra et al. shows a method and device for drying substrates comprising housing substrates 244 within a processing vessel 240 containing DI water, supporting the substrate within the processing vessel by supporting means 248, lowering the fluid face of the DI water through drain region 231 by drain valve 236, introducing drying fluid through nozzle 306 and supplying inert gas into the processing vessel through nozzle 302, 304 during exhausting of the DI water from the processing (col. 10, lines 28-34) same as claimed. Means 231, 236, 248 is capable to continuously maintain the liquid layer of the drying fluid for continuously lowering a fluid face of the cleaning fluid DI such that a liquid layer of the drying fluid on the cleaning fluid is continuously maintained. With regard to claim 5, Mohindra et al. teaches that the drying gas replaces the cleaning fluid during exhausting of the cleaning fluid (col. 10, lines 28-34).

Therefore, it is inherent that the supplying quantity of the drying fluid and/or the inert gas is increased in order to replace the cleaning fluid. Patent to Mohindra et al. discloses the claimed invention except for means or controlling section for controlling the inert gas supplying section,

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the exhausting section and the drying fluid supplying section. Kedo et al. teaches a substrate drying apparatus with means or controlling section 41 for controlling the inert gas supplying section 18, the exhausting section 7 and the drying fluid supplying section 13 same as claimed. Taniyama et al. teaches a substrate drying apparatus with means or controlling section 60 for controlling the inert gas supplying section 66, the exhausting section 28 and the drying fluid supplying section 64. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the substrate drying apparatus of Ferrell to include means or controlling section for controlling the inert gas supplying section, the exhausting section and the drying fluid supplying section as taught by Kedo et al. or Taniyama in order to more efficiently control the drying.

5. Claims 11, 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrell (U. S. Pat. 5,653,045) in view of Kedo et al. (U. S. Pat. 6,219,936) or Taniyama et al. (U. S. Pat. 6,247,479) as applied to claims 10, 23 above, and further in view of Sakata (JP59-156995).

The drying apparatus of Ferrell as modified by Kedo et al. or Taniyama et al. as above includes all that is recited in claims 11,24 except for the drying fluid supplying nozzle inclined at an inclination angle same as the predetermined angle of the inclined substrate. Sakata teaches a substrate drying apparatus having a holder 15 for supporting substrates 14 within the processing vessel 11 in an inclined condition at a predetermined angle with respect to a vertical plane. Nozzles 18 supply the liquid drops of the drying fluid 19 with the nozzle inclined at an inclination angle same as the predetermined angle of the inclined substrates 14 (see Fig. 2). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the drying apparatus of Ferrell to arrange the substrates

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and drying fluid supplying nozzle at same inclination angle as taught by Sakata in order to improve the drying efficiency.

6. Claims 2, 11, 24 rejected under 35 U.S.C. 103(a) as being unpatentable over Mohindra et al. (U. S. Pat. 5,772,784) in view of Kedo et al. (U. S. Pat. 6,219,936) or Taniyama et al. (U. S. Pat. 6,247,479) as applied to claims 1, 10, 23 above, and further in view of Sakata (JP59-156995).

The drying apparatus of Mohindra et al. as modified by Kedo et al. or Taniyama et al. as above includes all that is recited in claims 1, 11, 24 except for the drying fluid supplying nozzle inclined at an inclination angle same as the predetermined angle of the inclined substrate. Sakata teaches a substrate drying apparatus having a holder 15 for supporting substrates 14 within the processing vessel 11 in an inclined condition at a predetermined angle with respect to a vertical plane. Nozzles 18 supply the liquid drops of the drying fluid 19 with the nozzle inclined at an inclination angle same as the predetermined angle of the inclined substrates 14 (see Fig. 2). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the drying method and apparatus of Mohindra et al. to arrange the substrates and drying fluid supplying nozzle at same inclination angle as taught by Sakata in order to improve the drying efficiency.

7. Claims 1, 5, 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrell (U. S. Pat. 5,653,045) in view of Kedo et al. (U. S. Pat. 6,219,936) or Taniyama et al. (U. S. Pat. 6,247,479) and Mohindra et al. (U. S. Pat. 5,772,784) or Mehta et al. (U. S. Pat. 4,816,081).

Ferrell teaches a method of drying substrates comprising holding substrates 601 at an angle of 0 degrees with respect to vertical in a processing vessel 602, purging vessel 602 with



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nitrogen, introducing a cleaning fluid 622, using low pressure nitrogen and nozzle 610 to form individual liquid drops of a drying fluid 607, introducing drying fluid 607 at room temperature under liquid condition into processing vessel 602 onto the fluid face 622 of the cleaning fluid, lowering the fluid face 622 of the cleaning fluid with respect to the substrate and purging the vessel 602 with hot nitrogen. Note column 10, line 10 to column 11, line 8; column 11, lines 30-31; and Figures 6 and 6. However, Ferrell does not disclose means or controlling section for controlling the inert gas supplying section, the exhausting section and the drying fluid supplying section. Ferrell also does not teach supplying inert gas into the processing vessel during exhausting the cleaning fluid from the processing vessel. Kedo et al. teaches a substrate drying apparatus with means or controlling section 41 for controlling the inert gas supplying section 18, the exhausting section 7 and the drying fluid supplying section 13 same as claimed. Taniyama et al. teaches a substrate drying apparatus with means or controlling section 60 for controlling the inert gas supplying section 66, the exhausting section 28 and the drying fluid supplying section 64 same as claimed. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the substrate drying apparatus of Ferrell to include means or controlling section for controlling the inert gas supplying section, the exhausting section and the drying fluid supplying section as taught by Kedo et al. or Taniyama et al. in order to more efficiently control the drying. Mohindra et al. teach a concept of supplying inert gas into the processing vessel through nozzle 302, 304 during exhausting of the DI water from the processing (col. 10, lines 28-34) same as claimed. Mehta et al. teach a concept of supplying inert gas into the processing vessel during exhausting of the cleaning liquid from the processing vessel (col. 6, lines 24-30) same as claimed. Therefore, it would have been obvious to one having

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ordinary skill in the art at the time the invention was made to modify the substrate drying method of Ferrell to include a step of supplying inert gas into the processing vessel during exhausting of the cleaning fluid from the processing vessel as taught by Mohindra et al. or Mehta et al. in order to improve the drying efficiency.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrell (U. S. Pat. 5,653,045) in view of Kedo et al. (U. S. Pat. 6,219,936) or Taniyama et al. (U. S. Pat. 6,247,479) and Mohindra et al. (U. S. Pat. 5,772,784) or Mehta et al. (U. S. Pat. 4,816,081) as applied to claim 1 as above, and further in view of Fung et al. (U. S. Pat. 6,216,709).

The substrate drying method of Ferrell as modified by Kedo et al. or Taniyama et al. and Mohindra et al. or Mehta et al. as above includes all that is recited in claim 6 except for a pair of supporting members with grooves for supporting the wafers at different positions. Fung et al. teaches substrate holders 12 and 24 with grooves for supporting the substrates in multiple positions and to reduce water spots left on the substrates after drying. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the drying method of Ferrell to include a step of supporting the substrates at multiple positions as taught by Fung et al. in order to improve the drying efficiency.

9. Claims 15-16, 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ferrell (U. S. Pat. 5,653,045) and Kedo et al. (U. S. Pat. 6,219,936) or Taniyama et al. (U. S. Pat. 6,247,479) as applied to claim 10 above, and further in view of Fung et al. (U. S. Pat. 6,216,709).

The substrate drying device of Ferrell as modified by Kedo et al. or Taniyama et al. as above includes all that is recited in claims 15-16 and 26-27 except for a pair of supporting

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members with grooves for supporting the wafers at different positions. Fung et al. teaches substrate holders 12 and 24 with grooves for supporting the substrates in multiple positions and to reduce water spots left on the substrates after drying. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the substrate holders 12 and 24 of Fung et al. for the substrate support member of Ferrell in order to support substrates in multiple positions and to reduce water spots left on the substrate after drying.

***Allowable Subject Matter***

10. Claim 21 is allowed.
11. Claims 3 and 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

12. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

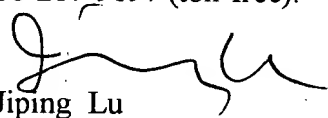
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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jiping Lu whose telephone number is 571 272 4878. The examiner can normally be reached on Monday-Friday, 9:00 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEVEN B. MCALLISTER can be reached on 571 272-6785. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jiping Lu  
Primary Examiner  
Art Unit 3749